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VOLUME XLIII MARCH, 1944 NUMBER 3

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Dr. Raisz of the Institute of Geographical Exploration, Harvard University, is an authority on cartography and author of the text, "General Cartography." He is keenly interested in geographic education and has made several contributions to the JOURNAL. His article, "The Analemma" appeared in March, 1941.

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Miss Forsyth is Assistant Professor in the Department of Social Studies, New York State College for Teachers at Albany. This is the seventh in a series of nine lessons on map reading, designed for junior high school level. Have you tried out these lessons with your students? Please tell us whether you have been successful in using them. What are the merits and demerits of the lessons?

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Mr. Ballert is an instructor in geography at the University of Chicago and is teaching Africa in the Air Corps meteorological program. Mr. George is a lieutenant in the Air Corps, and was stationed in the Meteorological Research Division at the University of Chicago, when this article was written.

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VOLUME XLIII MARCH, 1944 NUMBER 3

OUR LOPSIDED EARTH

ERWIN RAISZ
Harvard University

Our earth is regular in shape only; almost all geographically interesting features have a very uneven distribution. Most land is crowded into one-half of the globe, and population, and all that goes with it, is crowded into certain corners of this land. This unevenness of global distribution is an important geographical factor, especially worthwhile to study at the present time.

THE MEDIAN POINT OF LAND AREAS

Centrographers distinguish between two kinds of centers, one is the median point, and the other the center of gravity. The first derives by bisecting a certain area with a parallel and then with a meridian (or by any other two lines) and the intersection is the median point. There will be just the same amount of land in the two opposing quadrants but not necessarily the same in the adjacent quadrants, assuming that the area is relatively small and the spherical form of the earth is not considered. To bisect the whole earth's land area with a meridian is simple enough, but bisecting it with a parallel has little sense because it would be valid only if the earth were drawn on an equal-area projection with horizontal parallels, as the cylindrical equal-area, sinusoidal, or Mollweide projections. Nevertheless this has been done and found to be approximately at Lat. 27° N. and Long. 27° 30′ E., near the Farafra Oasis in Egypt.

A much more true center can be found if we use a great circle instead of a parallel which cuts the central meridian in an east and west direction. This center is true on a globe or on a map in oblique azimuthal equal-area projection (Lambert's) centered on the median point. This calculation has been performed and the median point of the earth's land area was found to be at Lat. 38° 25′ N. and Long. 27° 25′ near the city of Ismir (Smyrna) in Turkey.

As the icecap of Antarctica can hardly be called land, a more significant median point, as far as human relationships are concerned, was found at Lat. 49° 20′ N. and Long. 26° 20′ E. near the Ukraine-Polish boundary, near Tarnopol, Galicia.

For the sake of mathematical exactness, however, it should be noted that if two other great circles were used the result could be somewhat different.

THE CENTER OF GRAVITY OF LAND AREAS

The center of gravity of an area can be defined as the point upon which the area would balance if its map were cut out from a plate of even thickness drawn on an azimuthal equal-area projection centered on the assumed center point. In this definition, however, the spherical form of the earth has not been taken into consideration as it modifies it but little, as long as the area is small. However, when the center of all lands of the globe is sought the definition has to be changed. It would be quite possible to prepare a Lambert azimuthal equal-area map of the whole earth centered on an assumed center point and see whether it balances on it and repeat the performance until it does. Yet the center point of gravity thus obtained, in spite of the great amount of work involved, does not seem satisfactory. For instance, an island near the antipodal point appearing now on the margin of the map would by its great distance give undue importance to that direction, altho actually on the globe it would matter but little from which direction the center point would be approached from that island.

A much more satisfactory center of gravity can be established if we work with a spherical earth and take into account the actual location of every piece of land on the globe. The best and fastest method of finding the center of gravity seemed to be to take a very light globe and cover all land surfaces with an even sheet of lead. If this globe is floated in water it will come to rest with the center of gravity at the bottom. This was actually done by using a very light and very accurate 13-inch Dietrich Reimer globe, rendering it waterproof with shellac, and evening up the small irregularities of the shore line with "give and take" lines. An even sheet of 1/16″ lead was cut out in sections and nailed on with a snug fit. The globe was immersed in a tub of water and, after it came to rest, a flat board, with a circular level bubble on top and with wet oil paint on the bottom, was carefully lowered until it

touched and made a mark on the globe. This point represented the center of water areas, and the antipodal point to this was the center of lands. The following results were obtained:

(1) Center of gravity of all lands 43° 31′ N., 28° 20′ E. near Balcic (pronounced Balchik) in Rumania on the Black Sea, near the Bulgarian border.

(2) Center of gravity of all lands except Greenland and Antarctica 52° 45′ N., and 26° 30′ E. near Baranowicze, Poland.

(3) Center of Eastern Hemisphere, except Antarctica, 30° N. and 62° 15′ E. near L. Helmand in Afghanistan.

FIG. 1. Finding the center of gravity of all lands by immersing a globe on which all lands have been covered by a sheet of lead. Note circular level on a horizontal plate.

These points are not far from the corresponding median points, which is rather surprising considering the uneven distribution of the land masses. All these points are in Eastern Europe, a truly significant location if we remember that in general concept here is where East meets West and North meets South. The importance of these locations will be even greater as future centers of air communication.

LAND AND WATER HEMISPHERES

In connection with these measurements it seemed to be interesting to check upon the land and water hemisphere. The land hemisphere can be defined as the hemisphere with a maximum amount of land. The British atlases center the land hemisphere habitually on London, and textbooks always refer to this fact as significant for the roar of the British lion, notwithstanding the fact that German atlases place the center of the land hemisphere just as habitually at Berlin.

To find the true location of this center a cylindrical equal-area map of the world was taken and great circles were drawn for every five degrees of latitude on transparent paper. They were shifted back and forth on the equator until the best position was obtained

for each latitude. Comparing each of these best positions latitude 45° seemed to be the most favorable. Further refinements were made on exact larger-scale maps, and by trial and error it was

FIG. 2. World drawn on a Lambert azimuthal equal-area projection and centered on Balcic, Rumania, the center of gravity of all lands.
CG = Center of gravity of all lands.
M = Median point of all lands.
CG—A = Center of gravity without Antarctica and Greenland.
M—A = Median point without Antarctica.
CLH = Center of land hemisphere.
CEH = Center of gravity of all lands of the Eastern Hemisphere without Antarctica.

found that the best center is near the city of Nantes, France, at 47° N. and 1° 30′ W. It should be remarked, however, that this point is very shifty; if another point is taken 10 or even 20 miles

from Nantes the result is almost the same. Eighty and nine-tenths per cent of all land is in this hemisphere (90% without Antarctica), leaving 19.1% of land in the water hemisphere. These figures could be modified on account of very divergent quotations of the land surface of Antarctica and the Arctic islands.

Figure 2 shows the locations of the various centers on a Lambert azimuthal equal-area map centered on the center point of gravity.

THE AMOUNT OF LOPSIDEDNESS OF THE EARTH'S LAND SURFACE

The center of the world's land area established, the next problem is to express the amount of unevenness of its distribution.

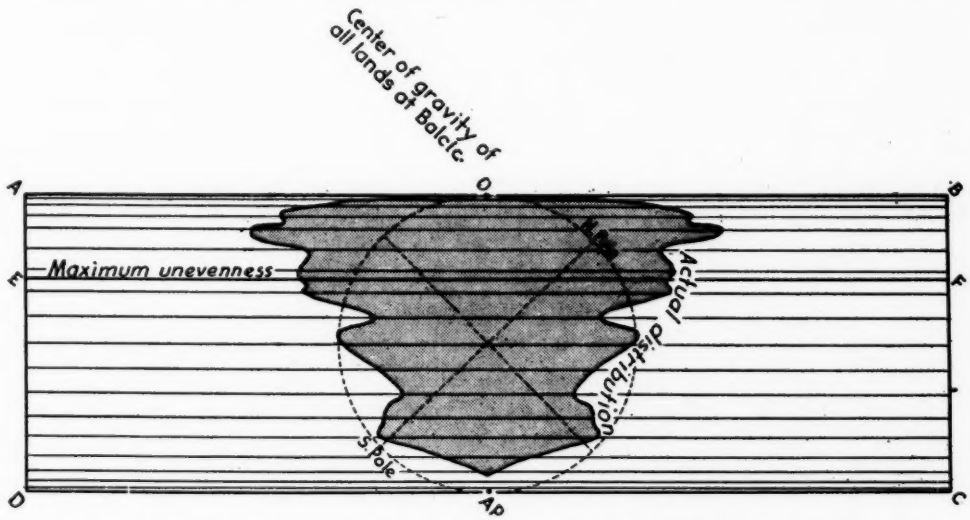


FIG. 3. Cylindrical equal-area projection of the globe, showing the unevenness of distribution of land centered on Balcic, Rumania.

Maximum evenness would be obtained if the earth's 28% of land could be evenly distributed over the globe in little equidistant islands. Minimum evenness would be if all land were within a concentric circle around the center or around any other point. In Figure 3, ABCD is a cylindrical equal-area projection of the globe projected from an axis going thru Balcic, Rumania, and its antipodal point. The globe has been divided into concentric strips of equal width and the amount of land measured in each strip. Plotting this amount left and right from the axis we arrive at a visualization of the distribution of land masses around their center of gravity. If all the 28% of the earth's land were concentrated solidly

around Balcic this maximum unevenness is shown by quadrangle ABEF. This diagram gives some idea of the amount of lopsidedness of the distribution of land, but it should be noted that from other centers the distribution would be different.

Centers of the Earth's Population

The median point of the earth's population is normally obtained by bisecting the number of people by a meridian and by a parallel and locating the intersection of the two lines. Altho this method, as far as the parallels go, was not favored in finding the center of land areas, it is not objectionable in regard to population. We always think of population distributed east and west and not along great circle lines. For instance, it would be a surprise to most people that the east-west line of New York if continued in great-circle directions will go thru Australia and Madagascar. We are likely to think of the median point of population as shown in a Mercator map which could be called a "loxodromic median point," as it bisects population along two compass directions.

By using the 1940 figures of the League of Nations and bringing up older census figures by percentage calculation to that year, the center of population was found to be 30° 50′ N., 70° 24′ E. near Lahore, India. It is interesting to note that the population figures of the U. S. Department of State (received by courtesy of Dr. S. W. Boggs) did not alter materially the calculation. The greatest difficulty was in bisecting the Indian provinces, the population of which was obtained from the Statesman Yearbook. Similarly difficult was the division of the Chinese provinces where Cressey's population figures brought down proportionately to present totals and the dot system maps of the Shun Pao Atlas were used. Population of Tibet was taken as 2,000,000 from its various estimates ranging from 1,000,000 to 6,000,000, and Yemen as 1.5 million from estimates ranging between 1 and 4 million.

Next the median point of the earth's population for 1900 was calculated. The census figures were obtained from the Statesman Yearbook and the World Almanac of that time, not however without modifications. For instance, the population of Anglo-Egyptian Sudan was then estimated at 10 million, altho the present census counts less than 6 million. Here, as in many cases, figures were adjusted to the present better-counted figures. It was found that the estimates of the lesser-known countries are generally too high

in view of later counts. The surprising effect of the calculation was that while the population of the earth grew from 1,600,353,000 to 2,233,307,000, nearly 40%, the median point remained practically the same, a little southeast of Lahore, India.

This stability is highly surprising as a 40% increase in 40 years is about the fastest the earth has yet experienced. It looks like powerful forces playing tag but the center of the rope shows only small jerks. Most of the northwest sector is the home of the white people while the southeast sector has mostly Asiatics. The opinion that the machine age and controlled hygiene favor the colored people more than the whites is largely contradicted by this fact.

It was intended to go back farther in the past but the 1860 data were so uncertain that no results of value could be obtained. The locations of the two centers are shown in Figure 4. These locations are well fixed; only a degree of change to either in latitude or longitude would move some 40 million people from one sector into another.

As this median point is true only on a Mercator map (or any map with horizontal parallels) an attempt was made to bisect the earth's population by a meridian, and a great circle crossing it in an east-west direction. Preliminary calculations locate this point near Lake Balkash in Khazakstan, a much less significant center than the loxodromic median point. No attempt was made to find the center point of gravity of population because on a spherical body it has very little sense. For instance, a single native of Easter Islands, by his great distance, would shift the center point more than thousands in India, altho it would matter very little for this Easter Islander from which direction to approach the center point.

UNEVENNESS OF DISTRIBUTION OF THE EARTH'S POPULATION

The distribution of the earth's land surface with Lahore in the center is shown by the Curve A in Figure 5. If the population were perfectly evenly distributed over the lands of the world the population curve would be identical with the land curve. The difference of the actual distribution and that of maximum evenness is shown here in grey and represents the amount of unevenness of distribution. It is significant that mankind is strongly concentrated around the center of population, gradually getting less with the distance. The center point of dispersion of humanity may not have been far from the present center.

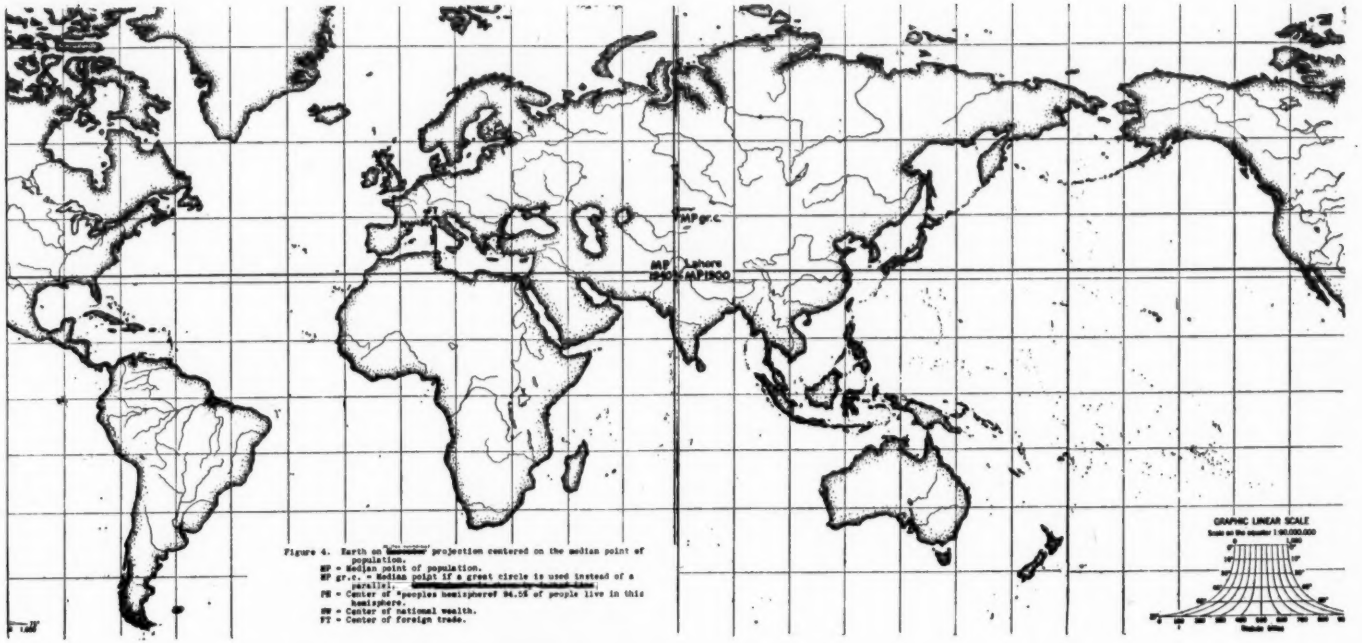


FIG. 4. Earth on Miller cylindrical projection centered on the median point of population
MP = Median point of population.
MP gr.c. = Median point if a great circle is used instead of a parallel.
PH = Center of "peoples hemisphere." 94.5% of people live in this hemisphere.
NW = Center of national wealth.
FT = Center of foreign trade.

THE PEOPLE'S HEMISPHERE

This can be defined as the hemisphere with the maximum people. Altho this calculation could not be performed with the same ac-

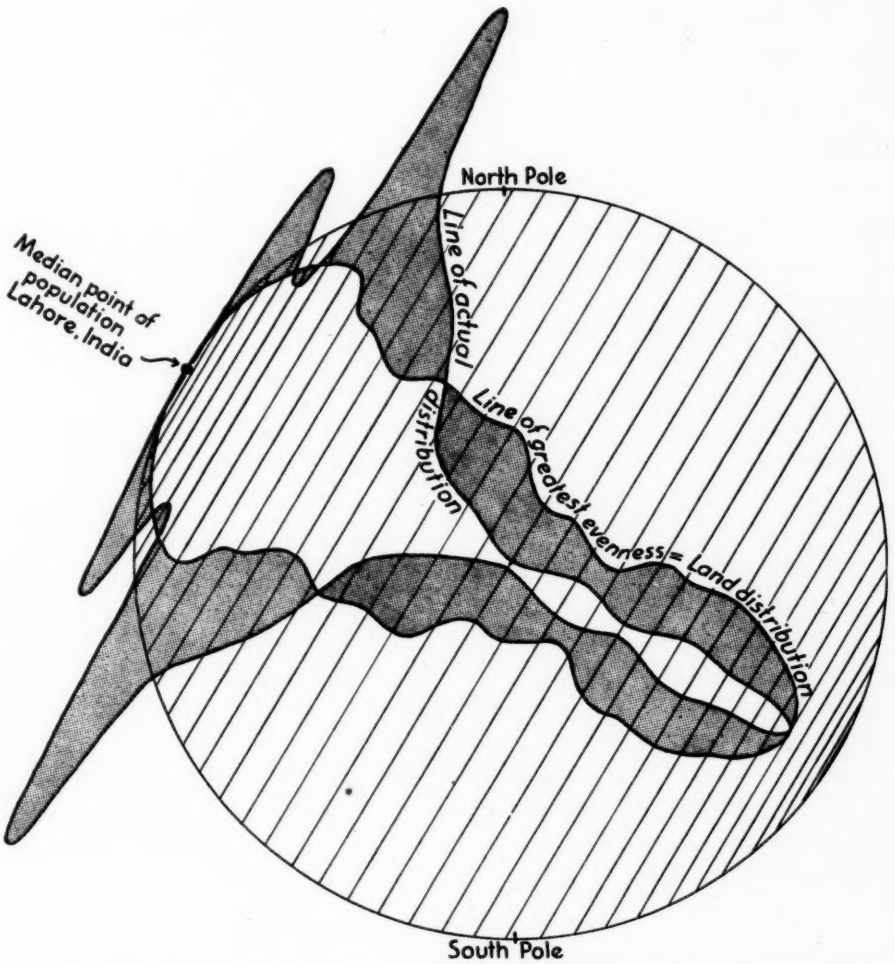

North Pole
Median point of population Lahore, India
Line of actual distribution
Line of greatest evenness = Land distribution
South Pole

FIG. 5. Unevenness of distribution of population. Greatest evenness would be attained if people could be evenly distributed over all lands. Shaded area shows the difference between this and actual distribution. Fine lines are concentric equidistant parallel circles around Lahore. The two curves are drawn on a reduced scale.

curacy as the land hemisphere, its center was found to be at 45° N. and 70° E. in the French-Italian Alps. 94.5% of the earth's population live in this hemisphere, an even greater concentration than the land hemisphere, a truly amazing unevenness of distribution. This

center point is also not well fixed; a 10 or even 20 mile change yields almost the same figures.

Center of National Wealth

For us the really significant centers of the earth are neither that of the land area nor the population. In war and peace numbers of people and numbers of square miles are not of the greatest importance. Neither is national wealth, yet this comes nearer to the center of importance of the earth. This point is not so well defined as area and population as the available estimates, dating back to the late 20's, are brought up to date by the author's most unreliable estimates. Yet this median point can be defined with relatively great accuracy because it is conditioned by the urban centers of North America especially by the New York parallel and the Paris meridian. This center was located in the eastern Pyrenees at Lat. 42° N. and Long. 2° 10′ E.

Center of Foreign Trade

This is not a very significant center but it has the advantage that detailed and up-to-date figures are available. The data here used are chosen from 1937, the latest most nearly normal year for a decade, and the figures are of the Statistical Yearbook of the League of Nations. The point is a median point obtained by crossing a bisecting parallel with a bisecting meridian and falls at Lat. 46° N. and Long. 7° E. near the border of France, Switzerland, and Italy.

It is interesting to note how all these centers fall in France or around France. France was always called the land of happy mediums, not too hot, not too cold, not too dry, and not too wet. Highland and lowlands, field and forest, riches and poverty, urban and rural life are more balanced than in any other country. It will perhaps add some comfort to this unfortunate country that it is the center of the land hemisphere and of the people's hemisphere, median point of the world's wealth, and foreign trade, and probably many other factors as well.

The most significant centers of all seem to be the ones in and around France. Altho it is not easily possible to calculate the centers of culture, inventiveness, education, etc., it is reasonable to assume they will center in Western Europe together with wealth, power, and others. The most remarkable fact is the enormous distance of these centers from the center of population. Apparently

the huge populations of the monsoon lands, India, China, Japan, and Java, are not of corresponding significance—at least at present —in the world's affairs. Even the center of land area is nearer to the really important centers than that of population. All men may be created equal but in some countries they are created altogether too often.

It is reasonable to assume that these centers will tend to get nearer to each other in the future for the following reasons: (1) The monsoon lands have already reached their maximum population while the other lands have not. (2) In the world in which every point can be reached in 60 hours by plane, we can assume a great increase in population and wealth in the so-called remote areas. (3) The conquest of tropical diseases will give great increase in the potentials of these areas. (4) With the growth of manufacturing, mining and lumbering, and lesser need for farmers, the large non-agricultural lands will get increased population.

The general trend seems to be for a more even distribution of population over all the lands even if locally concentrated in cities, and the centers of population, wealth, power and culture will gradually tend to approach the center of all lands, which is significantly enough at the cradle of our civilization in Ancient Greece.

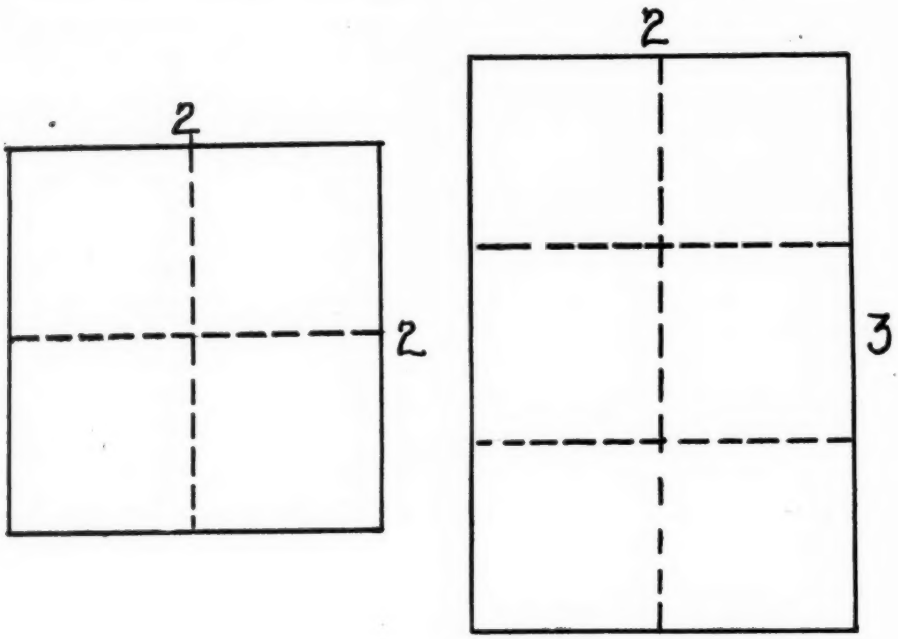
Wartime duties and war-disrupted data prevented the author from carrying this study any further, but it is hoped that it can be resumed again in more normal times, and especially that the shift of the centers thru the years can be studied.

MAP READING

ELAINE FORSYTH
Ithaca, New York

LESSON VII. TWO EQUAL-AREA MAPS

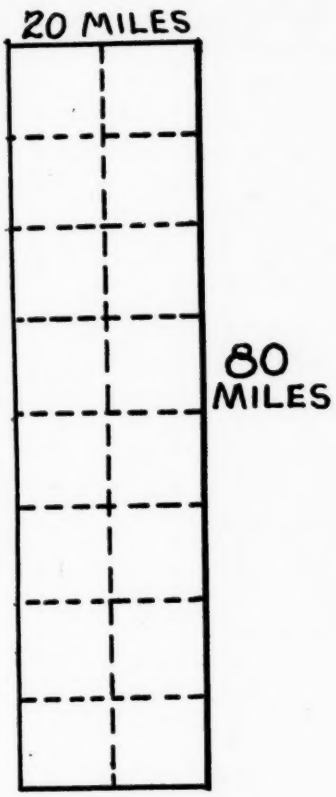
The Mercator map we studied last time is rectangular in shape. When we look at it, it is hard to remember that the earth is a sphere. Today we are going to examine two oval-shaped maps. They make it easier for us to realize that the earth is round.



Before we discuss equal-area maps perhaps we had better decide this question: What is area? The easiest answer is this: Area is the amount of surface (land surface or water surface) enclosed by lines. Suppose we have a square 2 inches by 2 inches. To find the area, that is, all the space inside those four lines, we multiply 2×2. The area is 4 square inches. Suppose we have a rectangle 2 inches by 3 inches. To find the area we multiply 2×3 and find that the area is 6 square inches. You can probably figure out the area of a county which is 80 miles long and 20 miles wide.

The land of the earth—the islands, the countries, the continents—is usually not of a regular shape, like squares and rectangles,

but men have learned how to measure the area of uneven shapes as well as even ones. These men are the surveyors who go out with their instruments and find how many square miles there are in a piece of land. Almost all the land of the earth has been surveyed, so we know the size of countries and continents. If you are interested you may want to look at the *World Almanac* or the tables in the back of your geography textbook and compare the areas of countries you are studying.



Rice County

Many people get confused about two things—*size* and *shape*. Just because two pieces of land are the same size, that is they have the same *area,* is no reason to think they have the same shape. Take the two states New York and Louisiana as examples of this. They have nearly the same area, about 49,000 square miles, but they do not look at all alike. Their *shape* is different.

The important fact as far as map-reading is concerned is this: We know from the surveyors that certain land areas are large, and others are small. Sometimes we want a flat map which will show us exactly how large or small countries are in relation to

each other. On an equal-area map we can see exactly how countries compare in size.

It may be easier to understand this kind of a map if we look back at the Mercator first. Do you remember that on the Mercator countries are stretched out too large toward the north and south? Look at Greenland again on the Mercator map. It is several times as large as it should be. Now if you drew a square like this □ on Greenland and another square □ the same size on South America, do you think both those squares represent the same amount of land? Your answer should be *no*. Greenland is puffed up too large, so your square on Greenland does not represent so much area. This is difficult to understand at first so perhaps you had better try it out. On our wall Mercator take a square—perhaps two inches by two inches—on the equator. Use the lines of latitude and longitude (each degree is equal to 70 miles at the equator) and figure out the number of square miles in those four square inches. Now do the same thing at 80° N. Remember that at 80° N. a degree of longitude is equal to about 12 miles. Are there the same number of square miles in each of your squares?

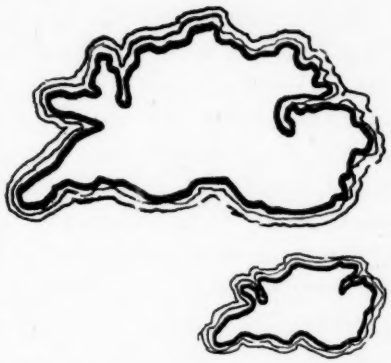
On an equal-area map any square □ that you draw is equal to any other □ the same size. This is another way of saying that the areas are shown correctly on this map.

Let's turn to the Mollweide map first. (See map in your atlas.) It is oval in shape. Some geometers call this shape an *ellipse*. And long ago they discovered a very strange fact about this ellipse. You can put the area of a sphere which is round all over onto an ellipse which is flat *if* the ellipse is twice as wide as it is high. So if you want to put the whole spherical globe onto a flat piece of paper you can show the areas exactly *if* you keep the equator twice as long as the prime meridian. Maybe you'd better measure the Mollweide to see that this is true.

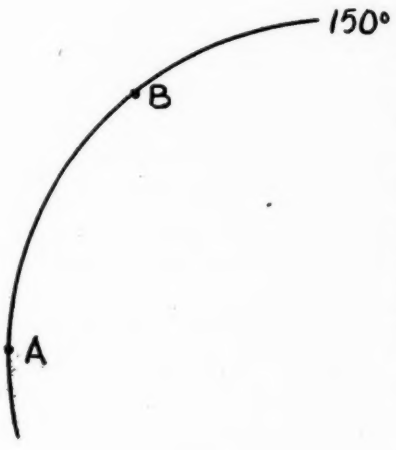
The parallels are straight lines. They get a little closer toward the poles, but not much. The prime meridian is a straight line, but the rest of the meridians are curved toward the poles. How are the poles shown on this map?

We have said that this is an equal-area map. As you know now this means that the sizes of countries are correct. See how small Greenland looks in relation to South America. Canada looks just a little larger than the United States. Compare the sizes of the Scandinavian countries with their sizes on a Mercator and then on the globe.

Here is another difference between this map and the Mercator map. On the Mercator map the *shapes* are correct. An island like this (top right) may be much too large, but the bays and peninsulas and shape of the island are correct. On the Mollweide map this island may look like this (bottom right): It will be the right size, but it may be out of shape.



If you look at your map now for Alaska, you will see this. We can be sure that Alaska on this map has the right number of square miles in it. We can compare it in size to the United States or any part of the world, and be sure that the sizes are correct. But the shape! It is so distorted that it is hard to recognize. New Zealand and southern South America are also distorted. If you observe closely you will see that the greatest distortion occurs on the outer edges of the map. Check with the globe.



There is no scale given on a Mollweide because you can't use the same scale all over the map.

Direction is shown by the parallels and meridians, of course, as it is on all maps. There is one thing you must be careful about. A meridian shows north and south—no matter how curved it may look. It may not seem to you that B is directly north of A, but *it is*.

The second equal-area map is named after Mr. J. Paul Goode who first made it. It is oval in shape like the Mollweide map, but the first thing you notice about it is that it is broken up or interrupted. You've done enough experiments flattening orange skins so that you should recognize the shape. Mr. Goode flattened the orange skin, and left the holes in his map. The map you have is interrupted in the water areas, so that you can see the land very clearly. Sometimes map-makers cut open the land areas in order to show the oceans better.

All we have said so far about equal-area maps applies to this one. You can be sure that areas are shown correctly. This map has one advantage over the Mollweide. It concerns *shape*. Surely by now you should be able to see that by leaving blank spaces in his map instead of stretching it like Mercator or pinching it like Mollweide, Mr. Goode has been able to keep the shapes of his countries much closer to the way they are on the globe.

The reason this map is brought to your attention is this: Many students are bothered by the open spaces on the map. They think the distance between New York and London is all the way across the paper. It isn't. The distance between New York and London is from New York to the hole in the map, then on the other section across to London. In order to use this map intelligently you have to pretend the holes *aren't there.*

Another difficult thing about the Goode equal-area map is that the meridians are very peculiar. They curve and they even have "waves" in them. You need to remember only what you know so well. Anywhere on a meridian is north or south—and it doesn't matter if it curves like a corkscrew!

Facts to remember:

1. Equal-area maps are valuable because they show area correctly, and often we need to be able to compare the size of two countries.

2. Since no flat map can be perfect, the equal-area maps distort *shapes* of countries more or less, depending on the map.

3. The Goode interrupted equal-area map shows sizes correctly and shapes fairly well. In reading we have to remember to skip the gaps.

4. On equal-area maps, as on all maps the meridians show us north and south, and the parallels show us east and west.

NOTES ON THE CLIMATE OF THE COASTAL FRINGE OF NORTH AFRICA

A. G. BALLERT AND M. C. GEORGE
The University of Chicago

INTRODUCTION

This study presents a general picture of the climate of the coastal fringe of North Africa, from Mogador, Morocco, on the west, to Port Said, Egypt, on the east. The area covered has been typed by Thornthwaite[1] as follows (from west to east):

1. Semi-arid mesothermal	all seasons rainfall deficient	DB'd
2. Subhumid mesothermal	summer rainfall deficient	CB's
3. Semi-arid mesothermal	summer rainfall deficient	DB's
4. Arid tropical	all seasons rainfall deficient	EA'd

Climatic types according to Koeppen[2] are:

1. Mesothermal summer-dry, with warmest month over 71.6° F.—Csa
2. Hot summer-dry steppe, with an annual average temperature over 64.4° F. —BShs

The work devolves itself mainly into *a presentation of the dryness and heat of the coastal fringe,* and the seasonal variation of such factors. For purposes of exposition, and because of rather marked natural differences, the study is presented in two parts: the first covers the area from the Atlantic to Tripoli; and the second covers the area from Tripoli to Port Said. A further division is made within each part on the basis of the cool, wet period which is referred to, in general, as winter; and the hot, dry period which is referred to as summer. Data are presented for two non-coastal stations, Géryville, a station on the Hauts Plateaux in Algeria, and Siwa Oasis in western Egypt. These are used for comparative purposes.

A note on the grafs is given here as they are not commonly used in American climatic studies written by geographers. The precipitation grafs present, in the upper portion, the pluviometric coefficient. In the lower portion of the grafs are found the exact amounts of rainfall received in each month. Annual amounts in inches are found in the lower center.[3]

[1] See the *Geographical Review,* Vol. XXIII, No. 3, 1933, Plate V.
[2] According to the latest edition of J. Paul Goode's School Atlas.
[3] From *Mediterranean Pilot,* Vols. I and V, 1937.

The pluviometric coefficient measures the deviation of the rainfall in a given month from the amount that would have been received in that month if the rainfall were proportioned thruout the year. For example, January would have 31/365, February, 28/365, April, 30/365, etc., of the annual rainfall. The ratio between the actual amount received and the proportionate share is the "pluviometric" coefficient. A coefficient below 0.0 indicates a dry month, and a coefficient above 0.0 indicates a wet month. Thus, a value of 1 below the 0.0 line indicates that the month receives no rainfall, whereas, a value of 1 above the line indicates that the month receives once again as much rainfall as the proportionate share. Therefore, the grafs permit immediate recognition of the wetness or dryness of a given month without regard to the actual amount of rain at comparative stations and, thus, the variations of rainfall from station to station are eliminated.

The temperature grafs present the mean temperature as a white line, the range between the daily mean maximum and minimum temperatures as a black bar, and the range between the absolute maximum and minimum temperature as a hatched bar. A black line shows the annual mean temperature march for Cape Spartel and Géryville since data for further plotting was lacking.

The authors wish to emphasize clearly that altho they are following the common practice of American climato-geographic studies, and are analyzing primarily that portion of the climate which is immediately useful in its relation to agriculture and ordinary human comfort, they do not regard this as a final type of study as far as climate is concerned. The study of the climate of coastal North Africa here presented was made in the belief that it would be of great personal and general interest to many people at this time. However, a detailed analysis of the climate on the basis of the frequency of airmass-type occurrence, and a presentation of typical synoptic situations which bring about characteristic surface and upper air features, such as sharp frost or icing; in other words, a climatic study based on the natural differences within the ocean of air itself, should be attempted as soon as such studies will not aid the enemy because of their implications for aerial combat.

All material in this report has come from published, unclassified public sources.

STATION LIST—FROM WEST TO EAST

NAME	LAT. & LONG.				ELEV.	LENGTH OF RECORD
	°	′	°	′	feet	years
*Mogador	31	31N	9	46W	56	?-18
	31	22	9	42	13	
Cape Spartel	35	47	5	55	197	4-28
Oran	35	42	0	39	171	6-30
Géryville (interior)	33	41	1	00E	4,298	15
Algiers	36	48	3	02	126	6-37
Bizerte	37	17	9	50	10	4-28
Tunis	36	48	10	10	108	7-35
Tripoli	32	54	13	11	56	5-39
Bengasi	32	07	20	02	26	4-50
Siwa Oasis (interior)	29	12	25	29	−75	10
Alexandria	31	12	29	53	105	10-51
Port Said	31	16	32	19	11	10-49

* Data from two locations.

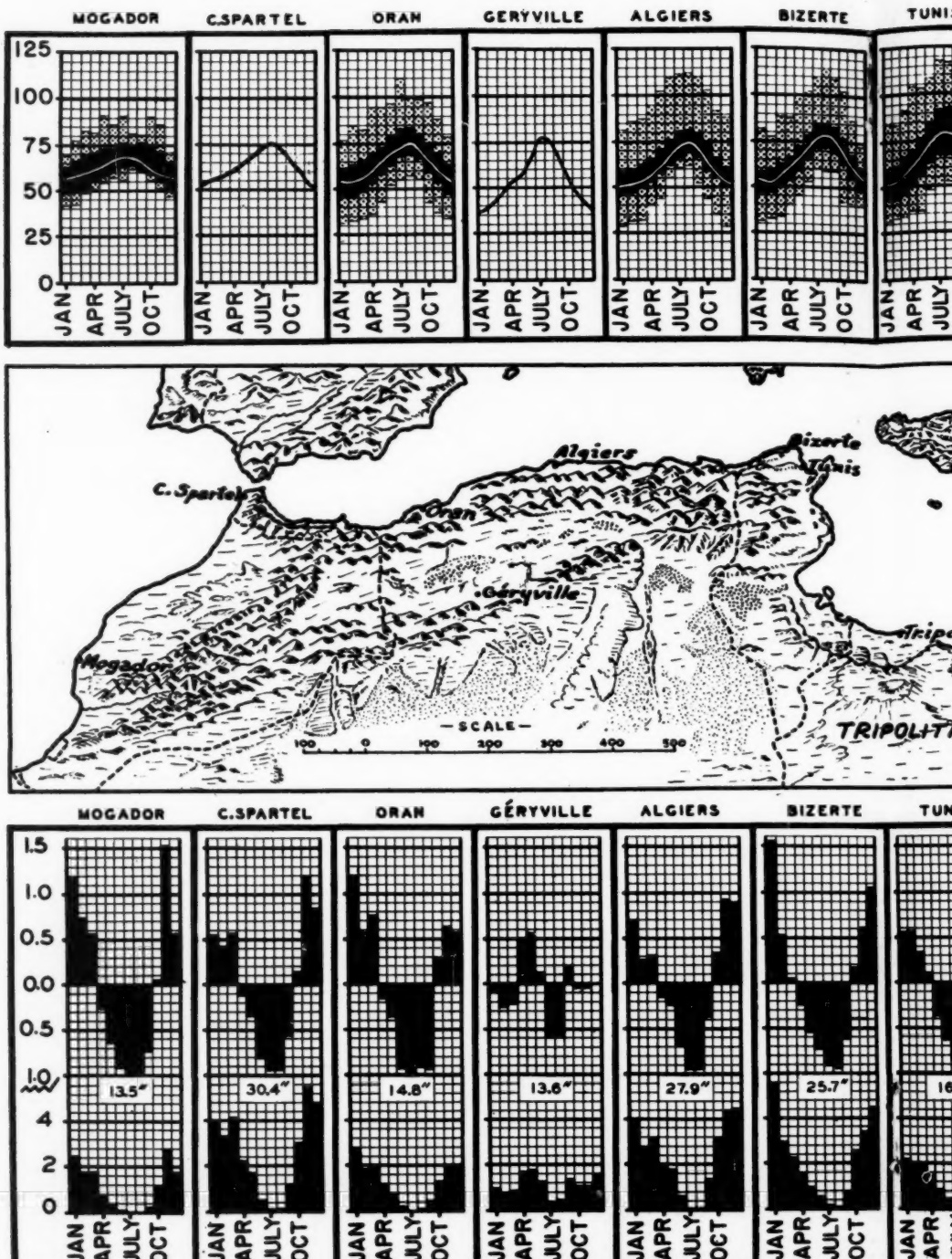
PART I. THE MEDITERRANEAN FRINGE—MOGADOR TO TUNIS

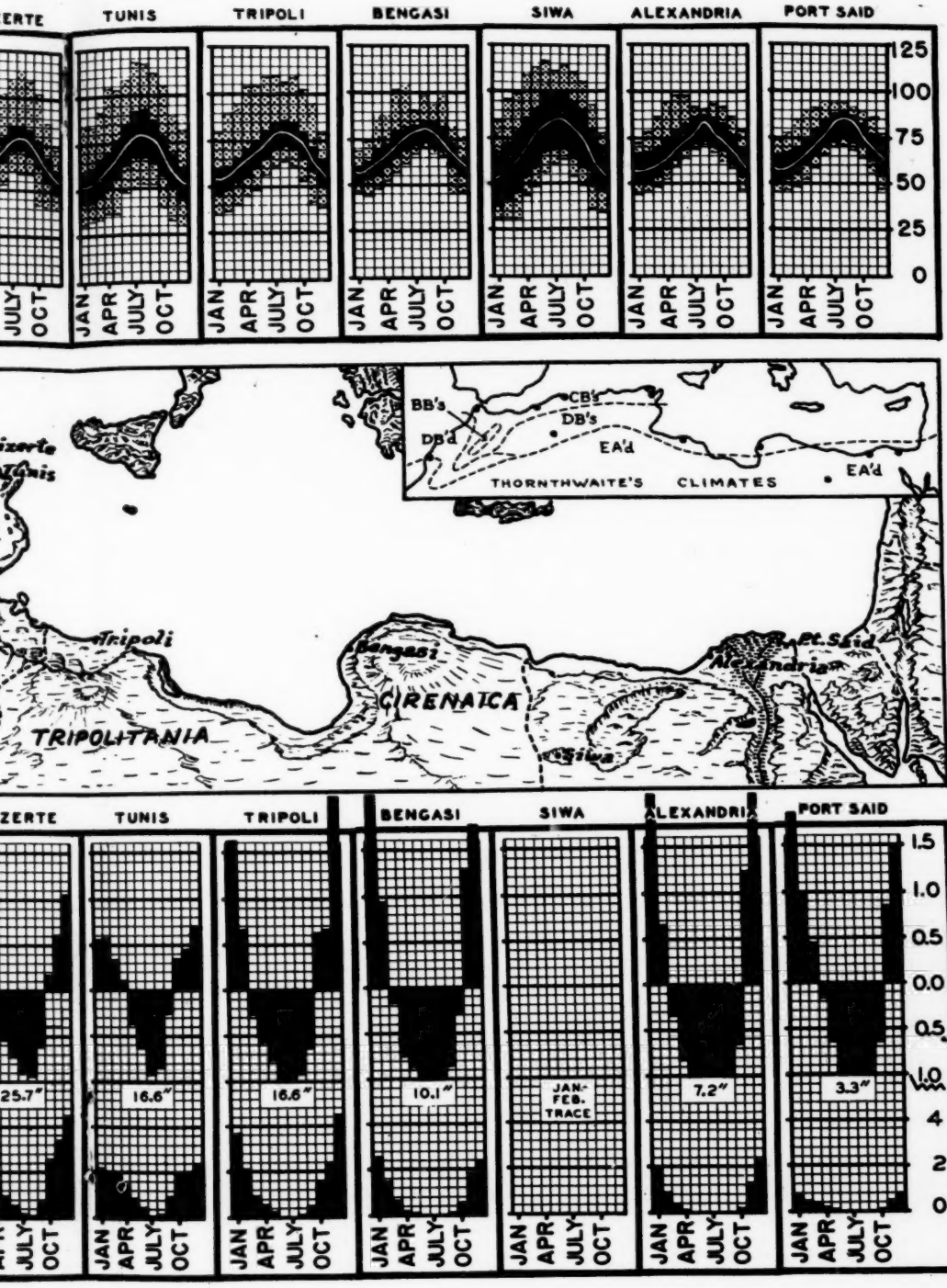
The first part of this discussion covers the strip of African coast from Mogador on the west, to south of Tunis on the east. The statements made, except when Géryville is used for comparative purposes, cover only the area approximately 30 miles inland from the land and sea boundary.

This is distinctly the wetter and cooler portion of the coast, compared to the region discussed in Part II. It has been termed the Mediterranean fringe due to its great similarities with the Mediterranean areas of southern France, Sicily and Sardinia. The true distinction between this region and that discussed in Part II is the greater accentuated dry period to the east, and the lesser amounts of winter rainfall received (see the rainfall grafs).

Mogador, of course, is not on the Mediterranean, but it was thought expedient to present the essential features of a Moroccan station since so much of our national interest has been focused on that area.

The true Mediterranean features are exhibited by all the coastal stations in this region. Two periods are evident from the grafs.


MOGADOR
C.SPARTEL
ORAN
GERYVILLE
ALGIERS
BIZERTE
125
100
75
50
25
0
JAN
APR
JULY
OCT
Algiers
Bizerte
Tunis
C. Spartel
Oran
Géryville
Mogador
TRIPOLITI
— SCALE —
100 0 100 200 300 400 500
MOGADOR
C.SPARTEL
ORAN
GÉRYVILLE
ALGIERS
BIZERTE
1.5
1.0
0.5
0.0
0.5
1.0
4
2
0
13.5"
30.4"
14.8"
13.6"
27.9"
25.7"


ERTE
TUNIS
TRIPOLI
BENGASI
SIWA
ALEXANDRIA
PORT SAID
125
100
75
50
25
0
JAN
APR
JULY
OCT
BB's
CB's
DB's
DB'd
EA'd
THORNTHWAITE'S CLIMATES
Tripoli
Bengasi
Alexandria
Pt. Said
CIRENAICA
TRIPOLITANIA
Siwa
ZERTE
TUNIS
TRIPOLI
BENGASI
SIWA
ALEXANDRIA
PORT SAID
1.5
1.0
0.5
0.0
0.5
1.0
4
2
0
25.7"
16.6"
16.6"
10.1"
JAN-FEB. TRACE
7.2"
3.3"

One of these is the wet, cool winter season. The other is the dry, hot summer season.

Summer—The Hot, Dry Period

The dryness of the summer in this coastal region is plainly marked. The pluviometric portions of the rainfall grafs illustrate the relative dryness of all the months from April to September. Tunis has the least marked dry season, but it is still substantial. Several inches of rain are about average for the summer season.

Géryville presents an interesting contrast to the otherwise consistent pattern. It is at an elevation of over 4,000 feet and is approximately 150 miles inland from the coast to the north. Rainfall shows a completely different pattern from that found on the coast. The rainfall graf indicates the spring maxima so common on plateau areas thruout the Mediterranean area. This gives a good idea of how rapidly the Mediterranean regime breaks up inland from the coast. With varying local topography, local climatic patterns are established.

The lack of rainfall in this dry season along the coast is due to the northward shift of the mean path of the cyclones (low pressure areas) which bring the winter rains. With the advent of summer, cyclones take a more northerly course, and the region is free most of the summer from those features associated with cyclonic activity. However, occasional summer fronts may bring rain, or a local thunderstorm may develop.

Mean summer temperatures range below 75° F., and express the influence of the maritime environment. The mean daily maxima and minima have about a 15° F. range which allows for comfort at night. Absolute maxima and minima show a quite remarkable range of roughly 50° F. This is almost as marked as in the interior of the Sahara to the east (see Siwa). Altho the mean daily maxima and minima are not as widely spread as in the Sahara, temperatures over 100° F. are commonly recorded in the eastern portion of this region.

Both the daily minima and maxima occur during occasional passages of traveling high pressure areas. At first, as these bring cool, dry air into the region, temperatures which are low for the season are recorded. Later, especially in the daytime, subsidence and insolation in the clear, dry air create optimum conditions for high temperature recordings.

Cloudiness in this season varies from place to place, but a

cloud cover of roughly 20% to 40% is normal. Humidity is high, with local variation, but between 55-70% relative humidity is common. However, at Mogador, mean cloudiness is less than this (18%), and the humidity is much higher (80%).

Winds vary locally with exposure, but the common thing along the whole coast is the predominance of the land and sea breeze, with winds from a southerly or northwesterly quadrant most of the time. The southerly winds are, of course, drying and commonly dusty winds, whereas the northwesterlies are usually cool and moist and give rise to the building up of cumulus clouds along the shore.

Blue skies with scattered billowy clouds, and brilliant illumination are as much a landscape feature of this area in summer as are the native quarters of the many ancient coastal towns.

WINTER—THE COOL, WET SEASON

Probably one of the commonest misconceptions of the rank and file of the troops and newspaper correspondents going into North Africa last autumn was the idea that a rainy season was an unusual occurrence. When our troops were bogged down in Tunisian mud, a reporter for one of our prominent weeklies made the comment that native information revealed that the rains were usually over in February. Perhaps that is the answer the natives knew they ought to give to make a hit. Everyone seemed surprised by rain in North Africa.

The rainy season begins in September. In this area, the first rains are often very heavy. The wettest period is normally in December and January, altho the Atlantic stations, Mogador and Cape Spartel have November maxima. The heavy rains which occur in autumn and winter rarely amount to falls of four inches.

These rains occur with the passage of various types of fronts (traveling cyclonic storms) which, with the approach of the cold season and the shift of the whole Northern Hemisphere circulation southward, begin to pass by the northern fringe of North Africa.

Along this portion of the coastal fringe, the rainy winds of the cool season are westerly and northwesterly; the rain falls in showers lasting a few hours, continuous rains being rare. There is also considerable year to year and local variation in rainfall depending upon the vagaries of the winter cyclonic circulation.

Hail, snow, and thunderstorms, associated with the winter traveling lows, are not uncommon. Hail is frequent in the spring,

and in most areas has a March maximum occurrence. Snow is rare, especially at sea level, but it occurs frequently on the higher areas inland from the coast. It usually falls on one or two days each winter at sea level in Algeria, is unknown at sea level in Morocco, and almost unknown in Tunisia.

Thunderstorms may occur at any time of the year, but in most regions they are more frequent in autumn than in any other season. They may occur as infrequently as once per season as at Oran, or as often at 14 per season at some coastal stations in Algeria (14 at Cape Carbon in fall, and 40 per year).

Cloudiness varies locally, but a 75% cloud cover is normal at most places. This cloudiness is mostly low and medium sheet cloudiness with some vertical structure (stratocumulus), and is composed of those forms typical of our own autumn cyclonic rains.

Temperatures are normally in the fifties (° F.), but freezing or near freezing temperatures have been recorded at most places in December, January, and February. This is not true, however, at Mogador, or at Cape Spartel where the influence of maritime airmasses is strongest.

All in all, the troops in North Africa will learn to associate this portion of North Africa with the coastal portion of California. The two regions are very similar climatically, and to some extent geographically. Only the great differences in culture act as constant reminders that they are not in the United States.

PART II. THE DESERT FRINGE—TRIPOLI TO PORT SAID

Many of our newspaper and newsreel pictures of military operations in the section of North Africa from northwest of Tripoli to Port Said have shown clouds of dust and sand impairing the movement of both men and machines. These pictures are representative of the period when this region is as much desert as the heart of the Sahara to the south.

But there is another period of weather in the Tripoli to Port Said coastal fringe area. That is the rainy period. When the rains come to this region, they bring in their wake mud and occasional floods, which sweep with unrelenting force against anything unfortunate enough to be in their paths. This is the time of the year during which the area receives most of its water, and also the time when all modern transportation is virtually bogged down in the mud of the unpaved roads.

Generally, the weather here as in the western or Mediterranean fringe may be divided into two periods: the hot, dry period from the end of April to the end of September and the cool, rainy period from October to May. However, the rainfall is much less than to the west, and provides the basis for separation of the two regions. Dryness and temperature both increase from west to east, and from north to south.

SUMMER—THE HOT, DRY PERIOD

The true desert nature of the dry period is clearly illustrated by the pluviometric and rainfall grafs. One can see at a glance the absence of rainfall and relative dryness of this coastal area in summer and can note that the dryness is a seasonal counterpart of conditions existing the year round in the interior (Siwa).

Mean summer temperatures range from 66° F. to 88° F. on the coast, and from 72° F. to 100° F. inland. Temperatures over 100° F. have been recorded even along the coast. Highest temperatures are frequently recorded in June, altho July or August has the highest mean temperature. Dryness and temperature increase from Tripoli toward Port Said.

In the interior (see Siwa), the rapidity of daylight heating in the clear cloudless atmosphere of mid-morning causes great instability and turbulence, especially at low altitudes. This also results in great quantities of fine sand and dust being carried into the air. Local whirling sandstorms called "simoons" in Libia, and "haboobs" in Egypt reduce visibility to almost nil, and bring especially uncomfortable conditions to the coastal areas when occasional summer low pressure areas move across the Mediterranean region and cause extensions of the southerly winds from the interior to the coast.

Rapid heating also causes visual distortions. Heat waves emanating from the super-heated sand and rock make perception of distant objects difficult, and create mirage effects.

Cloudiness is rare during the summer, altho cumulus and even some stratus cloud is occasionally encountered along the coast. Early morning coastal fogs, caused by the radiational cooling at night of the fairly moist air over the Mediterranean, occur on about seven days per month in some places, but they burn off quickly. Relative humidity is between 60% and 70%.

"Hell is hot," J. Russell Smith once started a book. So is this section of the North African coast; hot and dusty, and even the

devil himself could hardly make daily life more uncomfortable than it sometimes is in the summer period of this region.

Winter—The Cool, Wet Period

In September, incident upon the shift of the direct sun south of the equator, cyclonic lows begin to pass along this coastal area in increasing frequency. The rainy weather related to these storms begins gradually.

Rains are rather infrequent in the fall. In Libia, there are one to three days with rain in September. This increases to four to nine days with rain in November. Rainfall increases in December and January and then tapers off gradually.

Altho not shown on the rainfall grafs, the upland escarpment of Cirenaica (for example Cirene with 28″ of rainfall) receives the highest rainfall of any of the coastal area. In 1924, 53″ was received with 20.5″ falling in January of that year. This also illustrates the great year to year variability of the rainfall in this part of the world.

Average cloudiness increases thruout the fall, reaching a maximum of 50% to 60% coverage in December, January, and February. In Egypt, that is, east of Cirenaica, the cloud cover is generally between 38% and 40%, altho Alexandria has a 50% coverage in December and January.

Mean winter temperatures, on the coast, range from 50° to 70° F., with the higher temperatures to the east. Temperatures gradually decrease thruout the fall to winter minima, then gradually increase to summer maxima.

Dry, dusty winds off the desert have their greatest incidence at the beginning and end of the wet period, namely in fall and spring. However, any given year may show a wide departure from the average. In Egypt, a dust storm known as the "khamsin" occurs during the period from February to May inclusive, the greatest frequency being in April. The occurrence of such storms is about 12 a year, altho they may vary in any one year from five or six to seventeen or eighteen.

In Libia, "ghibli" is the term applied to dry, hot and at times dusty winds originating over the desert and affecting the coastal areas of Tripolitania and Cirenaica. Dustiness is variable. Sometimes the wind is a continuation of the simoon and then the ghibli is extremely dusty. There is a higher frequency of these winds in Tripolitania than in Cirenaica.

In contrast to the summer dryness, the winter in this region is relatively moist, especially in Cirenaica. Exceptional winter storms may bring great quantities of moisture especially where the winds blow up against local elevations in topography. All in all, this area has a fairly equitable winter climate, and in the larger cities where disease has been brought under control, and sanitation is practiced, the winter living conditions are quite pleasant.

CONCLUSION

The climate of the coastal fringe of North Africa is sharply broken into two seasons. The first of these is the hot, dry summer season; the second, the cool, wet winter season. A further division of the climate on the basis of the length of the summer drouth places the eastern portion—from Tripoli to Port Said—in a distinctly desert classification for at least six months of the year.

Altho both of the divisions of the coast discussed in this paper, that from Mogador to Tunis, and that from Tripoli to Port Said, are controlled by the same larger elements of the general circulation, and both exhibit the same seasonal cycle of temperature and cyclonic activity, they are different as far as human activity and plant life are concerned because of the difference in the amount of rainfall received.

The increasing dryness to the east is in large measure due to the less favorable exposure to cyclonic activity. Depressions are almost unknown along the eastern coast from May to September, and in the winter low pressure centers pass largely to the north. Distance and exposure to winds from the Atlantic, and important source of moisture, is chiefly an element in the variation in amount of orographic rainfall. Thus, the position factor and its importance to the east-west area can be well illustrated.

MISTAKES MADE IN GEOGRAPHY BY BEGINNING AIR CORPS CADETS*

HARRY K. HUTTER
State Teachers College, Moorhead, Minnesota

Today our nation is calling for men who are trained in fundamental skills. It is being realized far too often, as these men are tested, that they fall far short of reaching the standards necessary for efficient work. The war has challenged all lines of activity. Shall we in the field of geography measure up to the demands made upon us? It has been brought out repeatedly that geography has reached a new milestone. Greater emphasis has been placed upon its princicples. Training programs in college centers stress the importance of geography and it is being placed on an equal footing with physics, mathematics and other similar subjects.

A College Training Detachment (Aircrew) has been on the campus of Moorhead State Teachers College for the last eight months. Among the subjects these trainees have on their program is Military Geography. To most of us Military Geography is a new course. It necessitates the stressing of certain points which the ordinary course in geography does not stress. It must also be approached from a different angle and for a purpose which hitherto has been given little attention.

Another angle to the problem is the background of the cadets. They come, as it were, from all corners of the nation, from all walks of life and from a wide range of academic achievement. To mold these cadets into a unit whereby they may have grasped the fundaments of the subject is a herculean task.

In the geography program here one of the first things attempted is to determine the map skills of the cadet thru a diagnostic test. This test, which of course may not be the best nor accepted by all, does serve a purpose and does show many weaknesses of the cadet. Thru it, the instructor guided by the general points of weakness, is able to meet the needs of the majority.

In this short article, it is the purpose of the writer to point out some of the weaknesses which have been observed and to indicate the extent of the errors on these particular points. The diagnostic test has been given to approximately 500 cadets, and altho it is not an impressive number, it does tend to show the general trend.

* Paper delivered at Biennial Convention of Western Division Minnesota Education Association held at Moorhead Minnesota, Oct. 14, 15, 1943.

Before administering the test an attempt is made to make the cadet feel at ease. He is also told that the score he makes is not to be used as a part of his military record, but simply for our use in order that we might be able to help him in those things in which he shows a weakness.

In administering the test the cadet is given two sheets: one containing the set of questions and the other a Mercator map. The following is the list of questions used:

1. Place the directions North-South-East-West in proper positions on the margin of this map.
2. a. Write the terms Equator, Cancer, Capricorn, Arctic Circle, and Antarctic Circle along the proper lines.
   b. Write in the Prime Meridian and International Date Line along these lines.
3. Indicate which of the cross lines are parallels and which meridians by writing these terms once each along the correct line at some place near the bottom of the map.
4. The parallels and meridians are arranged at 15° intervals. Along the right and bottom of the map label each line correctly for longitude and latitude. Indicate latitude only to the 60th degree but longitude completely.
   Along with the degrees of latitude and longitude you have placed on the map indicate the proper hemisphere by using N for Northern; S for Southern; E for Eastern; and W for Western.
5. Place these names as nearly as possible on the land masses they represent: North America, South America, Africa, Australia, Asia, Europe, East Indies, West Indies, Madagascar, Greenland, and the Aleutian Islands.
6. Write in these three ocean basins: Atlantic, Pacific, and Indian.
7. Locate as nearly as possible and write on the map: Tokyo, Rome, Berlin, London, and Washington, D.C.

The Mercator map used is one which is constructed with parallels and meridians placed at 15° intervals and unlabeled. The light lines and International Date Line are represented by dashed lines, also unlabeled. Land forms are shown without names. Nothing is shown on the map in the way of printed matter, but the above symbols are clearly indicated. If the cadet understands the relationships little difficulty should be encountered in answering the above questions.

The following indicates the total points possible, the number secured, and the percentage which were right. Below the figures in each case are samples of common errors made in that particular question. It should be pointed out, however, that a number of papers have been returned in which a perfect score has been recorded. This is the exception rather than the general rule.

	Points Possible	*Points Obtained*	*Percentage Correct*
1.	1992	1805	95.63

East and West directions on map frequently interchanged.

2.(a)	2490	1102	44.26

Arctic Circle placed on 75°N.
Tropic of Cancer placed along International Date Line.
Tropic of Cancer and Tropic of Capricorn interchanged.
Equator placed at 15°N.; placed on the Tropic of Cancer.
Some cases showed two of these terms on the same line.

(b)	996	535	53.71

International Date Line and Prime Meridian interchanged.
Both on the same line.
International Date Line on Tropic of Cancer.
Prime Meridian placed along Tropic of Capricorn; along the Arctic Circle.

3.	996	462	46.39

Omitted entirely or interchanged.
They were found in a few cases along similar lines.

4.	8191	1577	19.25

In many instances entirely omitted or only partly completed.
If Prime Meridian or Equator placed incorrectly others wrong.

3984	821	20.60

In some instances hemispheres properly indicated altho meridians and parallels only partly completed.
The word East-West-North-South found on the map with no indication as to bounds.
In other cases it was clearly shown that they did not have any conception as to limitations.

5.	5478	4197	76.61

In many instances omitted.
Africa placed in South America; in Asia.
Europe placed in Siberia; in Africa.
Asia placed in Africa.
East and West Indies interchanged.
Greenland in Iceland.
Madagascar placed on the southern tip of South America.
Aleutians placed in the East Indies.

6.	1494	1261	84.40

The Atlantic and Pacific oceans interchanged.
The Indian Ocean placed north of Norway; north of Alaska.
In many instances not given at all.

7.	2490	1812	72.77

Tokyo placed in New Guinea.
Rome in the Malay Peninsula; in Finland.
Berlin in French Indo-China; in Russia.
Washington, D.C. placed in eastern Canada; in the Yukon Territory; in Argentina; in northwestern United States.

The above summary clearly indicates that there are many incorrect impressions in the use of symbols and in their application. To correct such a situation several things are necessary. It will take time and patience to give these men the skills necessary to carry on their part of the work in this great conflict. But the

problem is not solved as easily as that. It is necessary to go back into the schools of our land, beginning in the grades and carrying it on thru the college level, and demanding a sound program of geographic principles and facts based upon good teaching. Teachers, trained in geography, are not available today to meet present needs, but it is not too early to plan for the program to come.

Public attention is being focused upon all parts of the world. A revival of interest in world relationships is bound to result. It is not too much to anticipate a definite need for a much broader and more inclusive program than anything we have had in the past. We may even hope that geography may be looked upon as one of the essentials of a good education.

REINDEER-LAND AND CAMEL-LAND

ERSELIA M. BARTON
Carbondale, Illinois

Children love stories. They will listen to stories about almost any subject so long as the story-teller can give his subject in a half-way presentable manner and put his thoughts into words which the child can understand.

Perhaps it is because of the insatiable story appetite children have that there exists such a large amount of worthless tho time consuming stories and such poor story-tellers. Since many indiscriminating parents buy and read story books which are nearly valueless from the educational standpoint, it is vital that the teacher select wisely the stories to be told during school time. If possible the story should contain a multiple of values. It should not only teach the child words but it should give him a broad background and a foundation on which he can build concepts and ideas for the rest of his life. It is a lamentable fact that many primary teachers do not have a large collection of worthwhile stories on various subject matter fields.

Story-telling is an art. One of the prerequisites for being a good kindergarten or primary teacher is the ability to tell interesting as well as educational stories in such a manner that the child wants them repeated again and again.

The writer suggests the following two stories may be used in November or December. It is hoped that the stories will teach the

child at least two broad concepts about animal ecological geography, namely 1) that animal life varies over the earth's surface because of different environments, and 2) that the wild animals found in different physical environments exist there because they possess different body features which makes it easier for them to live in such an environment.

Reindeer-Land

Going up to his father who was reading the evening paper, Tom said, "Daddy, every year about Christmas time I see lots of pictures of reindeer. Now I have seen live cows, and horses, sheep and goats, why haven't I ever seen a real reindeer? Are there live ones? Where do they live? What do they eat?"

Putting aside his paper for the evening, Mr. Wilson replied, "I must take you to the city zoo, Tom, where you can see real live reindeer and see them eat hay. However tonight I can tell you where and how reindeer live."

"Reindeer live way up north where the sun hardly shines in winter. You know how long the nights seem here in wintertime, well, how would you like to live where the days are only a few hours long and the temperature during the long nights drops to forty degrees below zero? The winters are long and bitterly cold.

"In reindeer-land, the summers as a rule are very short and cool. The days are very long. For about a month in summer the sun shines almost twenty hours a day. Because the sun shines for such a long time, the snow melts and the ground thaws out on top so that it is very muddy and boggy. At this time of the year the vegetation grows rapidly.

"During the summertime reindeer feed upon the mosses, lichen, sedges and sometimes flowering and bushy plants. However in the wintertime when the ground is covered with snow he has a harder time to find food. Sometimes a hard crust of ice covers the snow. But the reindeer's body enables him to get food. He breaks the ice with his sharp hooves and horns called antlers. With his broad 'shovel-like' hooves he digs down thru the snow until he uncovers the dead vegetation below. Sometimes the holes in the snow are so deep that it is impossible to see the reindeer's head or front legs. Also in winter when it is hard to find food, the reindeer uses his sharp teeth and tough lips to eat the smaller branches and bark of the stunted birches, willow and aspens.

"The reindeer's big flat hooves which are sharp around the edge help him in other ways besides digging holes in the snow. They make it possible for him to walk on ice in winter without slipping or breaking thru. In the summertime they help him to walk on soft ground without miring down. And the reindeer protects himself from wolves by stamping and kicking them with his sharp hooves.

"You remember how cold it gets in winter in reindeer-land? That's right, forty degrees below zero. What keeps the reindeer from freezing? He doesn't freeze because he has several coats. He has a very thick skin which acts as a coat. Growing out of this skin is a thick oily short fur and also long hair which covers the fur. And beneath the skin during the summer the reindeer stores up a layer or coat of fat which helps keep him warm in winter.

"In the summer the reindeer sheds the thick short oily fur. However his thick skin still serves him well as a protection against the stings of millions and millions of mosquitos and black flies.

"There is another very interesting thing about the long hair and the skin of reindeer. Both the skin and the long hair contain small air sacks or air-cells which protect these animals from the bitter cold temperature and windy blasts in winter and from becoming too warm during the heat of the day in summer. Thus a reindeer has an 'air-conditioned' skin that protects it from winter blizzards and summer sunshine. Of what does this remind you?"

"Our theatre is 'air-conditioned'," answered Tom.

Mr. Wilson continued, "Another way the reindeer keeps warm is by traveling in herds for protection from the cold wind. It travels in herds numbering from one hundred to two hundred animals.

"In spite of the bad winters the reindeer does not catch colds. His nose is very long. Inside the nose is covered with hair. As the air passes thru the nose it is warmed before it reaches the lungs. Do you breathe thru your nose? Does your nose get cold in winter?

"The reindeer is very important to the people who live in the cold lands. It furnishes milk and meat as food. From the skins are made clothes, bedding and tents. With the animal's long sinews, the Eskimos and Indians sew their clothing and tents. Domesticated reindeer pull sleds or carry packs. A reindeer can travel a hundred miles in a day and pull a big sled behind him.

"Now, Tom, it is time for you to go to bed," said his father.

"Thanks, daddy," said Tom. "Tomorrow I want to tell Jimmy about the home of the reindeer."

Camel-Land

"Mother," said Tom, going up to her desk where she was busily writing, "in the large stores downtown I saw many pictures of reindeer and camels. Last night, father told me about the home of the reindeer. Will you tell me about the camels, please?"

"Yes, Tom," she replied, putting her pen down. "Camels are quite different from reindeer and their home is very different, too. Just like the reindeer with their 'air-conditioned' skin and thick fur coat can live in a land of blizzards and ice and snow, so the camels can live in a land of hot temperatures and little rainfall.

"Last night father told you about the kind of plants that grow in cold lands during the short summer. Very few plants are found where camels live because desert-lands are too dry and too hot. Much of the little rain that falls evaporates quickly. The few plants that do grow are often short, thick, or thorny."

"Can camels eat thorny plants?" asked Tom.

"They can eat thorny and hard shrubs without injuring their mouths because their lips are thickly padded. Camels can swallow large quantities of thorny food at one time and chew it later," she explained.

"If there is little water in deserts, how do camels get enough to drink?" asked Tom.

"That is a good question," remarked Tom's mother. "Camels can travel twenty-five miles a day for three days without any food or water. Sometimes, traveling from one water place to another, they go a week without drinking. Camels store large quantities of water in their stomachs. Their stomach walls are lined with small open-mouthed bags or pockets which are filled when they drink. Later, when the camel becomes thirsty, the water is squeezed out of the bags into the main part of the stomach.

"There are few places in deserts where animals can find drinking water. Some of the water is a little salty. Most animals cannot drink this water, but camels can."

"Is the sand and ground in the deserts as hot as our concrete sidewalks are around noon in summer?" asked Tom. "If the ground is so hot, how can the camels walk on it?"

"The sands are hotter than our sidewalks ever get," said Mrs. Wilson. "The thick shaggy hair and the padded feet and knees protect the camels from the blazing sun and the hot sand. At night, when air becomes very chilly, the hair keeps the camels warm.

"The camel's feet are well suited for walking in soft, loose sand and soil. Their broad feet keep them from sinking deeply into the loose earth. Each foot consists of two heavily padded toes which are held together at the bottom by one sole.

"Often there are terrible dust and sand storms in the deserts. From these storms a camel can protect itself in several ways. Its nose is long and narrow and the nostrils are lined with long hair that keeps the dust from getting into the lungs. The hair in the nose sifts out the dust. And, do you know, Tom, that by using the flaps of skin at the end of his nose a camel can close its nostrils? With its long lashes and transparent eyelids a camel can protect its eyes during sand storms. These eyelids when closed permit the camel to see but keep the dust out.

"So you see, Tom, many parts of the camel's body are useful for life in the desert.

"Now, mother must finish her letter. Tomorrow I'll tell you another story."

"The home of the camels is very different from that of the reindeer, isn't it?" remarked Tom.

"Yes, indeed!" said his mother. "And very different from the home of the animals which live around us. Don't you think it would be fun for you, daddy and me to visit the zoo and compare the various parts of the camel's body with those of the reindeer's and thus understand why it is possible for them to live in different environments?"

"Oh, yes! Let's do!" cried Tom, dancing with joy.

A FEW SUGGESTED ACTIVITIES

1. Take a trip to a zoo or museum and observe a few of the animals that live in different environments.
2. Have children bring to school last year's Christmas cards that have reindeer or camels on them.
3. Make a collection of reindeer and camels showing a variety of scenes. Perhaps they could make a picture book.
4. Sketch scenes of the lands where these animals live, such as reindeer in snow holes eating, or camels drinking at a water hole. Sketch a hoof of a camel and a reindeer. The children could perhaps sketch these animals on a Christmas card for their parents, or use as classroom decoration.
5. Make a chart showing the various uses made of these animals.
6. Have children print a few short sentences about either animal.
7. Sing songs and read poems and short stories containing words and ideas about the two animals.

THE DISTINGUISHED SERVICE AWARD TO PRESIDENT ATWOOD

The Committee of Award (consisting of Guy Harold Smith, M. M. Svec, Helen M. Strong, S. S. Visher, J. R. Whitaker, and ex-officio, President F. Cunningham and Secretary Thomas Barton) has awarded the Distinguished Service to Geography Award for 1943 to President Wallace W. Atwood of Clark University.

The following is a statement presented with the award:

President Atwood has actively participated in the Council's work from the very first, and has been its president. His contributions to geography have been varied and highly significant. Clark University's large share since 1920 in the training of geographers is largely due to him. His elementary textbooks are widely used. His "Physiographic Provinces of North America" is a valuable contribution. The journal, *Economic Geography,* which he established and edited, has been highly serviceable.

Dr. Atwood has been president of the Association of American Geographers, of the Pan-American Institute of Geography and History, and of the National Parks Association, as well as of the National Council of Geography Teachers.

The bestowal of this Award by the National Council is in recognition of our debt to President Atwood for much encouragement and aid in our efforts to increase the service of geography.

S. S. VISHER, *Chairman*

EDITORIAL NOTES AND NEWS

On his recent return from Venezuela, the president of one of our largest oil companies predicted that Venezuela would soon be producing a million barrels of oil daily. He also looked for a vast new development in Colombia.

The Petroleum Administrator for War, Harold L. Ickes, recently disclosed that 1,200,000 barrels of gasoline, fuel oils, lubricants, and other petroleum products are going to the armed forces daily. About one-third of all the gasoline produced in the United States is needed for various military operations. Also given out in October is the news of the completion of 32 plants producing 100-octane aviation gasoline, with 40 more promised within a few months. Five of the new plants are outside the United States and these are either completed or being built at Calgary and Montreal, Canada; and on the Dutch islands of Aruba and Curacao, just off the coast of Venezuela. Production of 100-octane gasoline is four times what it was early in 1942. Further news was that a total of 9,341,514 barrels of crude oil were shipped eastward from Longview, Texas, in October thru the 24-inch line of War Emergency Pipelines, Inc. Tank-car shipments of crude from Norris City, Illinois, had practically ceased in November. The accompanying 20-inch pipe line is expected to be sending fuel oil eastward early in 1944. Other sources of information indicate that the largest plant in the world producing butadiene from petroleum will be completed early in 1944 at Port Neches, Texas. Five oil companies, with the approval of the government, organized the Neches Butane Products Company to supervise the design of the plant and manage its operation.

In view of the fact that our yearly demand for gasoline is more than two billion gallons, public attention is focused on the possibility of getting oil from coal and for combining coal and oil. There are several basically different methods of producing liquid fuels on a commercial scale from coal and of using colloidal mixtures of coal and oil. Experimentation in Great Britain ever since 1914-1918 has centered especially around colloidal fuels. Our experimentation along with that of Great Britain indicates that coal, pulverized to a given standard mesh screen, and then thoroly wet by the oil and mixed with it gives satisfactory results as a fuel, but local overheating during storage must be avoided. Research in converting coal to oil and gasoline started in Germany in 1913. Commercial production began in 1927. It is believed that Germany gets about one-half or two-thirds of its war-time needs of gasoline from this source. In the Bergius process of coal hydrogenation, coal is mixed with a heavy oil, and a catalyst —such as tin oxide—is added and the mixture along with hydrogen is subjected to high pressure. Part of the coal is converted into heavy and light oils, and gases. The solids are then separated from the liquids and hydrogenation is repeated. This process is substantially one that removes oxygen and steps up hydrogen content. Bituminous coal normally has 5 or 6 per cent hydrogen whereas petroleum has about 13 per cent hydrogen. The Bergius process yields excellent antiknock gasoline. Another coal-to-oil conversion process, the Fischer-Tropsch process, converts the coal to carbon monoxide and hydrogen. When these gases are passed over catalysts, under controlled temperatures, the yields are waxes, oils, gasoline, and gases. The gasoline is of low-octane value, but the oil is excellent for diesel fuel, and can be converted into lubricating oil. In Germany, the Fischer-Tropsch method is reported to produce about one-fifth of that of the Bergius type. Tho Great Britain does not use the Fischer-Tropsch method of

commercial production, it is awake to its possibilities, not only as to fuel oils, but to a basic source material for synthetic rubber, plastics, and other chemicals.

Mexico has a six-year plan, begun in 1941, for promoting irrigation on more than a million acres of land. Recently two new dams were completed which will expand the program in northeastern Mexico, near the Texas border.

The Pan American Union, Washington, D.C., has a new series of 16-page booklets for the study of Latin America, for the elementary and junior high school grades. The price is nominal.

The United States Bureau of Mines reports that helium has been discovered on the Navajo Indian reservation near Gallup, N.M., in amounts equal to or in excess of those in Texas.

Many are eagerly awaiting the report on the $134,000,000 Canol project, by the Truman Committee of the Senate. This project of the Army was initiated last April. Plans called for the development of 3000 barrels of oil daily in the Norman Wells oil field by the Imperial Oil of Canada, and also for the construction of a pipe line of that same capacity from the field to Whitehorse where a refinery was to be built to produce 100-actane aviation gasoline. Canol was planned because the Army feared the Navy might not be able to protect the tankers bringing in oil to Alaska along in Inside Passage. The plans for the disposal of the Project's developments after the war, as well as the extreme cost of construction and operation, when other sources of supply were presumably possible, are among the items under fire of criticism.

According to the Soil Conservation Service, Washington, D.C., the results of conservation farming in the South are showing phenomenal increases in crop production. The expansion in peanuts and soybeans tended to reduce the harvest of seed from grasses. This lack of seed was serious in view of the expansion in dairy and beef cattle. Campaigns to collect forage-crop seeds have been astonishingly successful. The forage crop that has been so spectacular in converting worn-out soils and gullied fields into excellent pastures is Kudzu. Kudzu is also used on good land where it is cut for hay and restores nitrogen to the soil. It also provides grazing, and will afford excellent ground coverage when other crops are harvested on fields formerly producing Kudzu hay or pasture. The use of Kudzu is spreading so rapidly that it is likely that before long eight million acres will be in Kudzu. Northern states, too, are asking for a variety of Kudzu suited to their climate. In the meantime, Southern farmers are clamoring for various types of crop seed, the supply of which is inadequate. All are urged to produce their own seed if possible. Various types of clover, lespedeza, blue lupine, vetches, wild peas, and Bahia grass are urged for the Southeast. In other sections, sweet clover and alfalfa seed are in great demand. Where advance drought forecasts can be made, Sudan grass is an excellent supplementary summer annual. Over much of the northern half of the country, brome grass is rapidly finding a place in a hay-pasture program. It is frequently sown with alfalfa. Crested wheat-grass, too, is valued highly in the Northern Great Plains for beef production as well as for its ability to grow where conditions of limited rainfall existed. These are but a few of the grass seeds in demand which are used to increase the fertility of the soil in rotation with other crops; or as cover crops in the off season, especially winter, when other crops have been harvested; or as forage and hay crops for our needed expansion of dairy and beef production.

Changes in production are made so rapidly these days that it is increasingly difficult to keep informed on the changes. For that reason, teachers of geography need a very wide range of reading materials. For instance, even if your elementary text emphasizes the grazing and agricultural activities of Texas, that must not leave students ignorant of the vast number of industrial activities of that and other western states. For instance, just to mention a few illustrations, tin and magnesium are being processed in Texas, plants are building ships and planes, and rubber and a host of other synthetics are being produced there. Reports indicate that in central Texas, three million acres are being cleared of wild junipers in order to extract from them cedar oil and cedar wax. Also in East Texas, stumps on cut-over lands are being blasted out for use in the production of chemicals. To be sure these activities may be but transient phases of the war programs, but it behooves geography teachers to be on the alert for new orientations in developments over widely scattered areas.

War needs for tapioca have increased to such an extent that the War Production Board has arranged shipping space for 125,000,000 pounds of tapioca flour, principally from Brazil and the Dominican Republic. Our biggest supply formerly came from the Netherlands Indies. The flour is processed into dextrines, sizings, and adhesives, especially for use in the manufacture of ordnance shell tubes, the packing of drugs, parts, cartridges, bandages, and field rations.

A program of sanitation is to be sponsored along Colombia's Caribbean coast under the grant of a scholarship from the Rockefeller Foundation.

According to the president of the American Merchant Marine Institute, our merchant marine fleet will equal or exceed in tonnage the combined fleets of all other nations. Naturally, men identified with shipping face the problem of what to do with this fleet at the close of the war. A committee appointed by the Institute to study this problem has a number of recommendations one of which suggests that a certain tonnage be "frozen" so that it can form an available reservoir if needed by the Army and Navy. Since the normal life span of a seagoing ship is usually estimated to be 20 years and that of a vessel in fresh waters is 60 years, it is suggested that if possible some of the vessels might be stationed in the Great Lakes to extend their life beyond the span anticipated when anchored in salt waters.

According to the Federal Power commission the production of electric energy produced for public use, together with that produced by railroads, railways, and publicly-owned non-central stations in the United States for 1943 broke all previous records and totaled 220,776,000,000 kilowatt-hours. Production by water power was 33.5 per cent of the total output. The fuels consumed for the fuel-consuming power plants included 79,665,000 short tons of coal, 18,085,000 barrels of oil, and 301,090 millions of cubic feet of gas. Each of the fuels reflected an increased consumption.

Peruvian press reports continue to focus attention to the Chimbote region, Pacific gateway to the Santa River Valley. Included in the planning are the development of hydroelectric power, coal mining, irrigation, harbor improvements, sanitation, and industrialization. Irrigation is to reclaim 250,000 acres. A little coal has already moved out of Chimbote, where lighterage is required until the construction is completed of a pier for direct loading of ships. Power potential is rated at 500,000 kilowatts, and its development is underway. The first units are to be ready in 1945. A variety of manufactures, including steel, are in the plans.

GEOGRAPHICAL PUBLICATIONS

Guy Harold Smith and Dorothy Good, with the collaboration of Shannon McCune. **Japan—A Geographical View.** 92 pages, maps, index, references. American Geographical Society Special Publication N. 28. 1943. $1.50.

As stated by the authors in their preface, "This book presents a view of Japan at the outbreak of the present war. It is essentially a book of facts—not of opinion or prophecy. Its purpose is to bring together information concerning the physical geography, resources, population and economic life of Japan and point to connections between these basic conditions and the expansionism of Japanese military leaders." For so small space, the authors seem to have accomplished their purpose well. The size of the Pacific Ocean and Japan's location in relation to it and to Asia are pointed out as influences causing Japan to secure control of the outer rim of islands and of Korea and Kwantung for fortifications. To the maps of physiographic and climatic regions, of population and mineral distribution, and of world transportation routes and their length, Dr. Smith's versatile pen has added an excellent topographic map and an urban map using the global symbols. The importance of fishing, of agriculture with its labor problems, of the development of industries and their distribution in relation to power sources and to port cities, is emphasized. Attention is given to foreign trade and the factors determining its character and trends. Some 35 tables furnish most of the statistics one needs to get a fair conception of the problems of life in this island empire.

J. E. SWITZER

Indiana University

Glenn T. Trewartha. **An Introduction to Weather and Climate.** 354 pages, maps, diagrams, appendices, index, references. McGraw-Hill Book Company. 1937. $3.50.

This book is a response to a feeling of need for a "brief introductory text at the college level covering the field of weather and climate apart from the other elements of the physical earth." The author states that it is the "revised and expanded sections A and B of Part I of 'Elements of Geography' by Vernon C. Finch and Glenn T. Trewartha," an admirable and widely used text. The expansion and revision is largely in the format rather than in any important change from the former text. The topics, headings of chapters, of divisions and of paragraphs are nearly identical to those in the former text. The type is large and easy to read. Much of the material printed in the earlier text in very small type is here placed in large type in the main body of the text. A few maps and diagrams are enlarged, i.e., the "Rainfall Reliability" map, from one-half to whole page size (p. 228). A few maps and diagrams are included as, sections of weather maps showing the relation of passing cyclones and anti-cyclones to frost conditions in southern California (p. 261). Three fold-in maps show climate types according to the authors and to Köppen and Thornthwaite. Other plates, outline maps in pocket, furnish opportunities for exercises in seasonal distribution of temperature and rainfall and for charting climatic data.

J. E. SWITZER

Indiana University